

General public knowledge and use of dietary supplements in Riyadh, Saudi Arabia

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ABSTRACT

Context: Dietary supplements is a growing industry, pharmaceuticals are having several types of similar supplements and multivitamins as over-the-counter products, a complete diet is necessary for a healthy body which leads to the usage of supplements or multivitamins complementing diets as needed, therefore leading to its encouraged usage among the population worldwide. **Aims:** The study was aimed to determine the public's knowledge and their use of dietary supplements. **Settings and Design:** A cross-sectional study was conducted among the general public of Riyadh, Saudi Arabia. **Methods and Materials:** The sample consisted of 679 participants including 41% males and 59% females. The ethnicity of the participants is 100% Arabs. **Statistical Analysis Used:** SPSS. **Results:** The sociodemographic data showed there were more female participants than males (59.1% vs. 40.9%), most of our participants had at least bachelor degree (64.4%), most of our participants had normal BMI (62.3%). 88.5% had knowledge on supplements and only 11.5% stated they were not aware at all. **Conclusions:** Dietary supplements and multivitamins consumption is prevalent among Saudi Arabian population. Our study suggests the majority of consumers understand the supportive role of dietary supplements and are aware of risks and side effects.

Keywords: Dietary supplements, general public, multiminerals, multivitamins, nutrition, Saudi Arabia

Introduction

A dietary supplement is defined by the Food and Drug Administration (FDA) as a product intended for ingestion that contains a "dietary ingredient" intended to add further nutritional value to (supplement) the diet.^[1] Dietary supplements are used by millions in many forms such as multivitamins and it is commonly used as a result of self-diagnosed conditions and/or promote health^[2-4] and the usage of supplements such as multivitamins

has increased considerably in the past several years,^[5] as it plays a key role in maintaining good health as a diet delivers essential nutrients while supplements complement said diet as it allows consumption of any deficiencies the diet lacks.^[6] With increased health awareness, education and availability for dietary supplements would lead to overall wide usage.^[7] It is often used to supplement diet, prevent illness, treat infection and remedy diseases.^[8] The average 20--30% of the populace in developed countries use dietary supplements such as multivitamins.^[9] And according to a study by AlRuthia *et al.*, 44.5% of participants were supplement users.^[10] In an attempt to improve overall

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Received: 29-06-2019 Revised: 22-08-2019 Accepted: 11-09-2019

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_511_19

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How to cite this article: Algaeed HA, AlJaber MI, Alwehaibi AI, AlJaber LI, Arafah AM, Aloyayri MA, *et al.* General public knowledge and use of dietary supplements in Riyadh, Saudi Arabia. J Family Med Prim Care 2019;8:3147-54.

health,^[11] nonetheless, consumers tend to not have enough knowledge about said supplements and its usage or if there is an interaction with other food substances, consumers tend to use them without consulting healthcare professionals.^[12,13] In 2008, in a study by Kennedy *et al.*, most Americans in tandem of conventional medical treatment use vitamin supplements, but only about a third discuss their consumption with a physician.^[14] The most commonly consumed dietary supplements are multivitamins/multiminerals, vitamin C, and vitamin D.^[15] And the most consumed non-multivitamin/multiminerals supplements are fish oil, omega-3/DHA, glucosamine, echinacea, flaxseed oil, chondroitin, and ginseng.^[16] Dietary supplements are important source of nutrients which helps fix any deficiencies.^[17,18] Manufacturers are not required to establish the safety and efficacy of herbal supplements to the FDA,^[19] which leads to industries involved in the creation of said multivitamins and are reported to be the world's fastest expanding industry.^[20] A balanced diet is necessary for the population to be overall healthy and to keep at bay chronic diseases and is a key component to proper dentofacial development.^[21-23] Dietary supplements such as multivitamins has benefits as there is a potential adverse effect due to overuse or higher than necessary intake.^[24] In earlier studies, they found that most dietary supplements in the market held more nutrients than the recommended daily need.^[25,26] Granting them have certain benefits such as folic acid intake which is established that prevents neural tube defects.^[27] Other examples including inadequate and irregular nutrition, sedentary lifestyle, stress, and cigarette smoking are risk factors for coronary heart disease, type 2 diabetes, osteoporosis, and cancers.^[28] Malnutrition is one of the leading causes of ill health in the developing world due to micronutrient deficiencies, as supplements have been a boon to those treating these deficiencies.^[29] It has been reported in literature that there is an interaction between vitamin E and aspirin causing an antithrombotic effect.^[30] There are some large scale randomized trials showing that multivitamins supplements are ineffective for the majority of the populace.^[31] In one of the randomized trial, 14,641 participants in USE showed that daily multivitamin supplement did not reduce cardiovascular events, such as myocardial infarction or stroke in men.^[32] Another trial for selenium and vitamin E cancer prevention trial showed that Vitamin E may increase risk of prostate cancer in healthy men.^[33,34] In a recent study in Saudi Arabia, almost half of the volunteers were consuming dietary supplements, the samples used in the research were health science students and the general public as participants.^[35] In a study that combined data from three separate studies showed that family physicians were prescribed dietary supplements the most.^[36] As it is trending worldwide, we wanted to assess the general public's knowledge and awareness on dietary supplements, due to the fact that it is used mostly as a trend and was not recommended by a proper physician or a dietician, which could lead to either deficits not being filled due to lack of knowledge or improper usage due to being influenced by others.

Subjects and Methods

Participants

This cross-sectional study was conducted among the general public of Riyadh, Saudi Arabia. The sample consisted of 679 participants including 41% males and 59% females. The ethnicity of the participants is 100% Arabs.

Inclusion and exclusion criteria

The participants must be Saudis and aged from 18 years old and above.

Instrument

The survey was divided into three parts. First part contained the gender, age, marital status, level of education, and weight. In the second part of the questionnaire, we asked about whether the participants' knowledge about dietary supplements and multivitamins are up-to-date or not, we also asked if they use or have ever used it or if they knew someone who uses it. The third part consisted of nine questions that addresses the attitude, perception, and behavior regarding the dietary supplements and multivitamins. In the last part of this questionnaire, we used an open question that tackles the participants' point of view whether the dietary supplements and multivitamins are necessary or just an obsession.

Data collection and analysis

This self-administered survey was distributed manually during an awareness campaign set in a mall on a span of 3 days. A verbal consent was obtained from participants. Data statistical analysis was done by SPSS software.

Ethics approval

The study was ethically approved by the Institutional Review Board (IRB) of Imam Muhammad ibn Saud Islamic University, Riyadh, Saudi Arabia [Project Number.35-2019] 02/04/2019AD.

Results

Our study included 679 Saudi Arabian participants. In order to reveal awareness and attitude toward dietary supplements and multivitamins among our participants we provided all of them with sample material. The main sociodemographic data obtained from our survey is presented in Table 1. There were more female participants than males (59.1% vs. 40.9%). As the participants included in our study were 18 years old and above, the distribution by ages was as follows: 18 to 25-51.3%, 26 to 33-20.3%, 34 to 41-17.4%, 42 and above - 11%. Most of the participants were single (53.8%), whereas married and divorced participants were distributed, respectively, 44% and 2.2%. Study participants were classified into five categories according to their education level, with the following distribution: elementary school - 0.9%, high school - 23.4%, bachelor degree - 64.4%, higher education - 9%. What applies to BMI, our results showed that 62.3% of the participants had normal BMI, whereas 28.1% and 9.6% participants had respectively BMI above and below average values.

Table 1: Relationship between consumption and some variables (n=679)

Variables			Consume dietary supplements and multivitamins		Total	P
			Yes	No		
Marital status	Single	Count	226	139	365	0.255
		%	52.7%	55.6%	53.8%	
	Married	Count	196	103	299	
		%	45.7%	41.2%	44.0%	
	Divorced	Count	7	8	15	
		%	1.6%	3.2%	2.2%	
Level of education	Elementary school	Count	4	2	6	0.327
		%	0.9%	0.8%	0.9%	
	Middle school	Count	13	3	16	
		%	3.0%	1.2%	2.4%	
	High school	Count	93	66	159	
		%	21.7%	26.4%	23.4%	
	Bachelor's degree	Count	277	160	437	
	%	64.6%	64.0%	64.4%		
	Higher education	Count	42	19	61	
		%	9.8%	7.6%	9.0%	
Weight	Below average BMI	Count	46	19	65	0.006
		%	10.7%	7.6%	9.6%	
	Normal BMI	Count	280	143	423	
	%	65.3%	57.2%	62.3%		
	Above average BMI	Count	103	88	191	
		%	24.0%	35.2%	28.1%	
Age	18-25 years old	Count	215	133	348	0.696
		%	50.1%	53.2%	51.3%	
	26-33 years old	Count	86	52	138	
		%	20.0%	20.8%	20.3%	
	34-41 years old	Count	80	38	118	
	%	18.6%	15.2%	17.4%		
	42 and above	Count	48	27	75	
		%	11.2%	10.8%	11.0%	
Gender	Male	Count	154	124	278	0.000
		%	35.9%	49.6%	40.9%	
	Female	Count	275	126	401	
		%	64.1%	50.4%	59.1%	

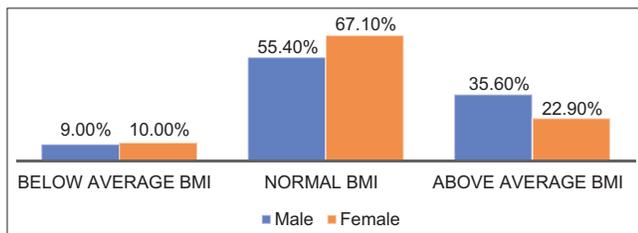


Figure 1: Relationship between gender and weight variables (n = 679)

A statistically significant difference was obtained for BMI distribution below average with predominance in females (female to male 10% vs. 9%, respectively). While 55.4% males had normal BMI, females had a larger quantity in this group (67.1%). Finally, males were found to have BMI above average in higher rates than females (35.6% vs. 22.9%) [Figure 1].

It seems that you are more likely to consume a dietary supplement if you are single compared to one that is married as shown in Table 1, 52.7% vs 45.7 respectively. As well as no statistically

significant relationship was observed between levels of education and age compared with the consumption of dietary supplements and multivitamins ($P > 0.05$). However, statistically significant relationship was observed for weight and gender variables ($P < 0.01$) [see Table 1].

We tried to figure out how much money do our participants spend on purchasing this kind of nutritional products. We divided the results obtained from our survey into three groups and received the following distribution: less than 200 riyals (50 USD) – 60.4%, 200 to 500 riyals – 33%, more than 500 riyals – 6.6%.

As the aim of our study was to evaluate how educated our participants were about dietary supplements and multivitamins, we provided this article with the answers given by our study participants in Table 2.

The results showed 50.7% of study participants had some knowledge about dietary supplements and multivitamins, 37.8% indicated that they are up to date, and only 11.5%

stated they were not aware at all. According to obtained answers, 63.2% of participants either consumed dietary supplements and multivitamins at the moment of filling in the survey or had ever consumed them in the past, while 36.8% did not ever taken in this kind of products. 48% participants marked not consuming any kind of dietary supplements and multivitamins, yet they knew a family member who did, 30.8% were aware that a friend used them, and 21.1% could not recall in memory anyone consuming. Finally, statistically significant relationship was found for the knowledge of our participants depending on the answer if it was up to date, and consumption of dietary supplements and multivitamins ($P < 0.01$) [Table 3].

We also tried to reveal what kind of supplements were the most popular and widely used ones among our study participants, so we received this kind of pattern: vitamins and multivitamins 32.1%, fatty acids 25.9%, minerals 24.3%, amino acids and proteins 17.7%.

Attitude of our study participants toward dietary supplements and multivitamins usage is illustrated in Table 4. Most of the participants (61.6%) expressed that dietary supplements and multivitamins could be a supportive option in treatment, however, the minority (15%) did not agree with that statement.

Table 2: Knowledge and prevalence characteristic (n=679)

		Count	Table n %
up to date with dietary supplements and multivitamins	Yes	257	37.8%
	have some knowledge	344	50.7%
	No	78	11.5%
Consume dietary supplements and multivitamins now or have used in the past	Yes	429	63.2%
	No	250	36.8%
If no consumption, know anyone that consumes it (n=250)	A family member	120	48.0%
	A friend	77	30.8%
	Do not know	53	21.2%
Type of dietary supplements used	Vitamins and multivitamins	218	32.1%
	Minerals	165	24.3%
	Fatty acids	176	25.9%
	Amino acids and proteins	120	17.7%

A large group (75%) of the participants considered supplements to cover any deficit in the diet and stated them to be harmful in case of excessive usage. Our results showed the majority of participants (55%) stated they consume dietary supplements and agree with the idea of multivitamins to be prescribed by a doctor or dietician, while 22.8% stated supplement consumption on their own, 11.9% were using based on advice given by coach, 10.3% consumed them relying on a friends' recommendation. Most of the participants advised to use dietary supplements and multivitamins with a medical prescription (79%), while 17.4% believed diet can cover all the nutrients needed, and only 4% warned against supplement usage. Most of the participants were sure that purchase of dietary supplements and multivitamins should be through a pharmacy (88%), while only 6.5% and 5.6% stated that internet and other means such as specialized shops, friends, gym, hospital, etc., are the main source of their dietary supplements purchase.

What applies to the leaflet reading that comes with the dietary supplements and multivitamins, 56% of the participants usually do read instructions, 30% read them sometimes, whereas 14% do not read them at all.

Discussion

There has been a great rise in demand for dietary supplements and multivitamins, so that the usage has spread to the point where this kind of products are bought off over-the-counter without any doctor prescription or dietician advice.^[7] Besides benefits, there are adverse effects.

For example, it is known that vitamins A and D are lipophilic therefore in case of overdosing excessive cumulation may cause side effects which can even be a treat for health.^[37]

The problem is most of the supplement consumers (55.8%) are unaware of any adverse effects and interactions as it was shown in Saini *et al.* study.^[38]

The quantity of our study participants and the mean distribution by genders was similar to the characteristics of general population in Saudi Arabia, therefore our study results show the real image of the discussed issue. As dietary supplements are not recommended for children, the selected age distribution of our study participants was chosen correctly. The interesting finding

Table 3: Relationship between consumption and knowledge (n=679)

Variable	Consume dietary supplements and multivitamins		Total	P	
	Yes	No			
Are you up to date with dietary supplements and multivitamins?	Yes	Count	202	55	0.000
		%	47.1%	22.0%	
	I have some knowledge	Count	207	137	
		%	48.3%	54.8%	
	No	Count	20	58	
		%	4.7%	23.2%	

Table 4: Attitude characteristic (n=679)

		Count	Table n %
Dietary supplements and multivitamins help in:	Work	63	9.3%
	Gym	96	14.1%
	Assist in treatment	418	61.6%
	Do not help	102	15.0%
Supplements as thoughts are:	Give the body the full necessities	47	6.9%
	Cover any deficit in the diet	513	75.6%
	Gives the nutrients needed faster than a normal diet	106	15.6%
	Do not help	13	1.9%
Consuming dietary supplements and multivitamins are:	Not harmful to health	119	17.5%
	Excessive use is harmful	518	76.3%
	It does not cause harm or benefit	23	3.4%
	Harmful to health	19	2.8%
Consume dietary supplements and multivitamins should be:	With doctor prescription	373	54.9%
	Advice from a sport coach	81	11.9%
	Advice from a friend	70	10.3%
	Own decision (Self-acting)	155	22.8%
Read the leaflet that comes with the dietary supplements and multivitamins:	Yes	380	56.0%
	No	95	14.0%
	Sometimes	204	30.0%
Advise the usage of dietary supplements and multivitamins:	Yes, with a medical prescription	534	78.6%
	Believe that diet covers all the nutrients needed	118	17.4%
	Warn against the usage of supplements	27	4.0%
Purchase of dietary supplements and multivitamins through:	Pharmacists	597	87.9%
	Internet	38	5.6%
	Others like (specialized shops, friends, gym, hospital, etc.)	44	6.5%
Money spend on supplements:	Less than 200 riyals (50 USD)	410	60.4%
	Between 200 and 500 riyals (50 to 130 USD)	224	33.0%
	More than 500 riyals (above 130 USD)	45	6.6%
Longest length of time gone without eating fresh fruits and vegetables:	Less than a week	384	56.6%
	A week	143	21.1%
	2 weeks	69	10.2%
	More than 2 weeks	83	12.2%

was dietary supplements were more widely used among people of young age (18—25 years).

In terms of demographics, in our study, most of the consumers were female (59.1%), which coincides with several articles such as Sharma *et al.* (2014) with a majority of female consumers in their study.^[39] According to Alowais *et al.* (2019), 85.9% female participants were included in the study.^[35] In a study by Braun *et al.* (2008), 62.5% of participants were female,^[40] while Shahwan *et al.* (2018) showed their results with a prevalence of male participants - 56.1% compared with 43.9% females.^[41]

The relationship between consumption and education was apparent in our study—those having bachelor’s degree were the largest group consuming supplements (64.6%). This statement agrees with Alowais *et al.* (2019) finding applying to usage of supplements being higher in those having higher education (84.5%).^[35] In Braun *et al.* 2008 study, 67.9% study participants had a history of tertiary education and supplement consumption.^[40]

Our participants were quite knowledgeable on the topics of multivitamins and dietary supplements-----up to 88.5%

had knowledge on dietary supplements and its benefits. According to Al Tamimi *et al.*, 89.9% of study participants were knowledgeable.^[42] The awareness level was also high (91.6%) in Žeželj *et al.* study,^[43] and an awareness level of 98% was obtained by Qidwai *et al.*^[44]

About half of our participants were aware about what dietary supplements are and why they should be used, but 37.8% out of the other half were up to date with information, which was an indicator of high awareness level in Saudi Arabian population. 93.65% of Chandika *et al.* study participants had good knowledge about supplements.^[45]

It is good to note that 63.2% of our participants showed that they consumed dietary supplements, and this result had a similar percentage to a study performed by Saini *et al.* (2019) which was 62%.^[38] About a half of those who did not were aware of a familiar person consuming any kind of dietary supplements and multivitamins. 84.8% of Qidwai *et al.* and 64.2% of Saini *et al.* study participants were taking dietary supplements, yet only 30.5% of student participants were taking them according to Žeželj *et al.*^[43,44] Alowais *et al.* study showed the total participants

consuming dietary supplements were 49% and 53.6% of medical sciences students reported supplementary nutrition consuming.^[35]

A large group of our study participants (75%) were aware of dietary supplements usage limitations and aware of the side effects. 42% of Qidwai *et al.* study participants noted they were aware of harmful effects of dietary supplements and multivitamins.^[44] Saini *et al.* received 55.8% unawareness response regarding the harmful effects of vitamin supplements.^[38]

Alfawaz *et al.* in their study revealed that the majority (57%) of participants were taking supplements based on a doctor advice, whereas internet, friends, and other sources were chosen in descending order.^[46] These results confirm the ones obtained by our study, as our participants relied more to the doctor advice, even more, most of them was “for” selling supplements by prescription. The same study concluded that most commonly used supplements were proteins (29%) and multivitamins (21%), whereas our results show the following distribution: vitamins and multivitamins 32.1%, fatty acids 25.9%, minerals 24.3%, amino acids and proteins 17.7%. In Dickinson *et al.* study, 82% of participants declared people considering taking a high dose, single nutrient supplement should talk with their doctor first.^[47] Yet 79.6% participants of Croatian study stated they do not seek professional medical help in what applies to supplement consumption.^[43] According to Qidwai *et al.*, 66% of their study participants received recommendation of vitamin supplements by their doctors.^[44] The same result was obtained by Sekhri *et al.*—69.5% participants were advised to take in supplementary nutrients by their doctors.^[9] Chandika *et al.* received 71.43% positive answers to the question about supplements being advised by doctor.^[45] But in Rosalia *et al.* study only 27.6% stated being prescribed a dietary supplement by doctor.^[48]

A large group of our study participants was sure supplements may cover any deficit in diet. That is why they were asked if they ever had a long period of no eating vegetables and fruits, which are the main sources for vitamins and minerals. Most of them recalled a period shorter than a week, however the percentage for longer periods was high too. 55.8% students of health sciences in Alowais *et al.* study stated that diet only is enough to maintain good health, whereas only 37.1% of other specialty participants were thinking that way.^[35] Dickinson *et al.* study stated that 81% participants considered dietary supplements to be only a part of healthy diet and 80% stated they should not replace healthy lifestyle habits.^[47] 89% of Rosalia *et al.* study participants believed that intake of a balanced diet was best choice to maintain a healthy lifestyle.^[48]

It was already shown by Alowais *et al.* that students tend to consume more dietary supplements, mostly by health sciences students.^[35] The interesting fact is, multivitamins were the most popular among students, which represents the same pattern obtained by our study. Students with normal BMI (61.5%) and

the most physically active students (37.7%) took significantly more dietary supplements according to Žeželj *et al.* In the same study, medical students were compared to non-medical students, the latest showed lower rate of supplements intake, yet they were more knowledgeable about safety.^[43]

Supplementary nutritional products are often associated with great expenses, unworthy money spending, and economic burdening.^[49] In Saudi Arabia, this problem is not investigated well yet, but there may be a need to estimate annual costs. The major problem is multivitamins consumption by people of younger age, while there is no need as food provides enough nutrients to be healthy.

Conclusion

Dietary supplements and multivitamins consumption is prevalent among Saudi Arabian population. Our study suggests the majority of consumers understand the supportive role of dietary supplements and are aware of risks and side effects.

Supplements consumption is more prevalent in people of a younger age, which is either a sign of being anxious about own health or the real need of accessory support.

As the majority of participants were well educated in what applies to dietary supplements and multivitamins consumption, their main statements were to perform supplementary products' sales through pharmacies through a doctor prescription as the supplementary products may be a good assistance in treatment, which shows that primary care and family physicians participation in the communities health and awareness, but an excessive use of this kind of products can be tricky for health.

Consuming dietary supplements was not associated with high economic costs for the country: the mean spending was less than 200 riyals per month.

Some special groups need to be investigated on the subject of supplementary nutrients intake. We also recommend for special programs and campaigns on the topic of proper usage to the public.

Acknowledgements

Nil.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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